



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

**ON A SPECIES OF SIMULIUM FROM THE GRAND
CANON OF THE COLORADO.**

BY C. H. TYLER TOWNSEND.

During the past Summer, larvæ of a species of *Simulium* were met with very abundantly in a small stream in one of the branches of the Grand Canon, July 8th to 11th. This branch, or side canon, is the one down which the Hance trail leads, being situated about fifty-five miles in a straight line N. N. W. of Flagstaff, Ariz. It is a deep canon, about seven miles in length, and becomes boxed up in the lower part of its course. About two miles down in this canon a small stream takes its source from a spring at a point about 2500 feet below the rim. After flowing for a few rods the stream sinks, but reappears some distance down the canon, flowing on until it reaches the Colorado River, into which it empties. In this stream many colonies of the *Simulium* larvæ were found in places where the current ran swiftly over the smooth water-worn surface of the rock. In going up the stream from where it empties into the Colorado River to where it seeps out, a distance of fully three miles, I counted fifty-two colonies of the larvæ. There were six colonies below the lower fall, where the stream drops about forty feet over a shelf of rock (Archaean granite). It should be stated that the point where this stream seeps out is about 3000 feet below the rim of the canon, while the point where it empties into the Colorado River is about 5000 feet below the rim. There is, therefore, a fall of about 2000 feet in its uninterrupted course, or approximately 700 feet to the mile. The greatest fall is in the last mile or so. No larvæ were found in the few rods of its upper course, between the spring and the point where it sinks, the fall not being enough to form a swift current. The depths given are those below the south rim, which is 1000 feet lower than the opposite rim. The Colorado River is, at this point, about 2500 feet above sea-level, and the south rim about 7500 feet. These altitudes are from figures kindly furnished by the United States Geological Survey.

The larvæ were of all sizes at this date, from very small to apparently fully grown. In all cases they were attached to the smooth eroded surface of the rock in the swifter current, but were once found attached to leaves of grass growing in the stream. Empty whitened or yellowed pupa skins and cases were discovered in patches in some places. No live pupæ were noticed at the time, but on subsequent examination of material collected it was found that quite a percent-

age of pupa cases contained the fully formed pupæ, the flies having not yet issued. Besides these, larvæ of all sizes from many different colonies were collected. No adults, whatever, were to be seen.

These larvæ are much larger than those of *S. pecuarum* and *S. meridionale*, the largest measuring 13 mm. in length, and differ as well in certain points of structure. It is, therefore, thought well to give a description of them.

Fully grown larva.—General color of alcoholic specimens blackish, more or less mottled with whitish, the posterior extremity whitish, especially ventrally. Very elongate in form, narrowed on anterior half, segments of posterior half gradually widening to anal extremity, which is stout, with the ventral surface strongly bulged.

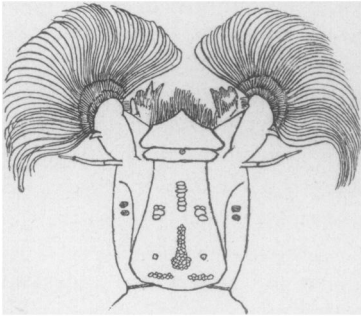


Fig. 1.

Head (see figs. 1 and 2) nearly quadrangular, a little longer than wide, dark brown or blackish in color, corneous, with two approximated, irregular black dots on each side near lateral margin (see fig. 1), and several rows and groups of nearly con-

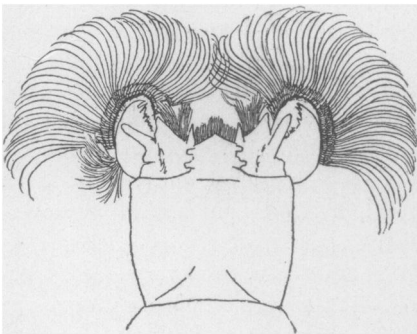


Fig. 2.

colorous markings on dorsal portion, as shown in fig. 1. *Antennæ* pale, nearly as long as one-half anterior width of head, 3-jointed, first joint very elongate and narrow, not swollen, slightly curved, with a somewhat faint transverse suture on basal two-fifths, cylindrical below suture, beyond suture very slightly and somewhat irregularly narrowing to tip; second joint narrower than tip of first, straight and of equal width, except slightly widened at base, a little more

than one-third as long as first joint, and with two small, triangular, bud-like processes, one on each side at base, springing from the junction of the two joints and approximated to the second joint; third joint

extremely small, short, minute, triangular, but a little longer than wide, about same shape as the minute processes at base of second joint (see fig. 1). *Fans* (see figs. 1 and 2) consisting of about sixty scythe-shaped rays each, the microscopically thinly hairy on outer side, sharply widened dorso-ventrally on about their basal one-fourth, and when spread, presenting the appearance about middle of widened portion of a crescentic serrate line extending over the width of fan

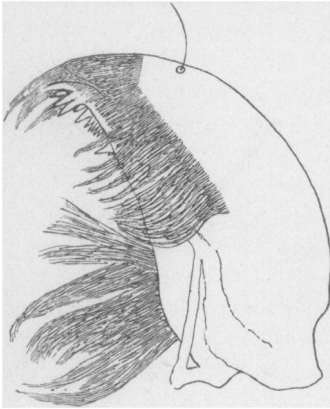


Fig. 3.

fig. 3). *Maxillæ* furnished on inner portion with a dense tuft of hairs, on outer with a blunt, subconical, horn-like process (see fig. 4).



Fig. 4.

dorsally, or slightly scalloped; at base dorsally with an X-shaped crossing, or branching of chitinous rods, the two anterior branches

near base. *Mandibles* elongate, rather stout, nearly twice as long as wide, furnished with teeth on inner side at apex; four large teeth on apex, nine or ten teeth behind these gradually decreasing in size, except that the second of these is larger than the first; a large tooth still behind these, with a small one directly beside it; mandibles furnished with dense brushes of hairs apically, more or less hiding the teeth, and basally, also with a regularly set fringe of hairs extending inward from anterior median portion (see

Thoracic proleg 4-jointed, elongate, subconical, truncate at end, last joint furnished with at least thirty obliquely longitudinal rows of hooks, and probably more; at base of these there is a marginal transverse row of bristles on side toward body (the proleg being flexed forward) extending around laterally, but wanting on outer surface. *Stigmata* (see fig. 5) showing on the dorsally tuberculiform extremity of body as a wide, transversely corrugated, blackish, more or less irregular circle, either flattened and slightly indented

extending a short distance forward beneath the integument ; a soft, retractile, primarily 3-branched organ just anterior to these on dorsum, each branch being subdivided into five smaller branches or papillæ. Length, 11–13 mm. ; width of head about 1 mm. ; of anal portion $1\frac{3}{5}$ mm. Described from many specimens.



Fig. 5.

Pupa (see fig. 6).—General color pale brownish yellow on the thoracic portion, abdomen darker ; head, wing and leg cases, and filaments pale yellowish, the head sometimes brownish ; prothoracic filaments arising from a single stalk on each side, which branches at base into usually eight filaments ; these do not subdivide. Third and fourth abdominal segments with five or six brown hooks or spines on posterior margin of dorsum. Eyes of adult, showing through the pupal skin in some cases, exhibit a remarkable difference in size of facets of upper and lower portion, those of lower half of eye (seen from side) not more than one-fourth as large as those of upper half ; division between large and small facets very marked and abrupt, in a line parallel with the longitudinal axis of the head. Length (excluding filaments) 4.5–5 mm.

Cocoon, or case.—Massed in coral-like aggregations. Open at top, but enveloping all of the pupa, except the filaments or the extreme anterior portion of the hunch-backed thorax. Length 4–5 mm.



Fig. 6.

EXPLANATION OF FIGURES.

- Fig. 1.—Head segment of larva, dorsal view (enlarged).
 “ 2.—Idem, ventral view (enlarged).
 “ 3.—Mandible (greatly enlarged).
 “ 4.—Maxilla (greatly enlarged).
 “ 5.—Anal extremity showing breathing organs, dorsal view (enlarged).
 “ 6.—Pupa, lateral view (enlarged).